**Science Writing Heuristic**

**Lesson 1 – Kinetic and Potential Energy**

* **GLE 0407.Inq.1** Explore different scientific phenomena by asking questions, making logical predictions, planning investigations, and recording data.
* **GLE 0407.Inq.2** Select and use appropriate tools and simple equipment to conduct an investigation.
* **GLE 0407.Inq.3** Organize data into appropriate tables, graphs, drawings, or diagrams.
* **GLE 0407.Inq.4** Identify and interpret simple patterns of evidence to communicate the findings of multiple investigations.
* **GLE 0407.Inq.6** Compare the results of an investigation with what scientists already accept about this question.
* **GLE 0407.11.2** Design a simple investigation to demonstrate how friction affects the movement of an object.

**Materials:** tennis balls, balls that bounce well, graph paper, scientist’s notebooks (or handouts)

**Time needed:** 1-2 hours

* + **Exploration of Pre-Instruction Understanding**
    - Review the meaning of energy, potential energy and kinetic energy
      * Demonstrate potential and kinetic energy by throwing and catching a tennis ball, and then allow students to throw and catch with a partner.
      * Have students record their ideas about potential and kinetic energy in their science notebooks under “Beginning Ideas.”
      * Share students’ ideas about potential and kinetic energy, and list them on the board.
      * As a class, define the meaning of potential and kinetic energy.
      * Have students come to a conclusion about how potential and kinetic energy are related, and record their thoughts in their science notebook.
      * Design an experiment to test each hypothesis.
  + **Pre-Laboratory Activities**
    - Have students get into groups of three.
    - Write the following items on the board and discuss each item. Have students copy this information.
      * Materials: ball, meter stick
      * Safety: eye protection, control balls
      * Hypothesis: (each student will write their own version)
* “If the ball is held at \_\_\_\_\_\_\_\_cm high, it will bounce to \_\_\_\_\_\_\_\_\_ cm high. ***GLE 0407.Inq.1 Explore different scientific phenomena by asking questions, making logical predictions, planning investigations, and recording data*** and ***GLE 0407.Inq.2 Select and use appropriate tools and simple equipment to conduct an investigation.***
  + - Record five different starting heights on the chart, make sure that they are all at least 10 cm apart. Students will have a hypothesis for each starting height.
    - The starting height of the ball and its bounce are the controls (what all other bounces will be compared to).
* The independent variable is the starting height and the height of the bounce is the dependent variable. This information will be discovered
  + - Check the design and hypotheses, and then give each group a ball to begin the lab
    - Provide an example of what the data table should look like



* + **Participation in the Laboratory Activity**
    - As students perform the experiments, make sure they record their data in their science notebook.
* After collecting data and writing their observations, students graph their data. ***GLE 0407.Inq.3 Organize data into appropriate tables, graphs, drawings, or diagrams.***
  + **Negotiation Phase I – Writing Personal Meanings**
    - Students write an explanation of their results under the heading, Claims and Evidence. “I can claim that the greater the potential energy, the \_\_\_\_\_\_\_\_ the kinetic energy because when the ball is dropped from a higher height,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. The less the potential energy, the \_\_\_\_\_\_\_ the kinetic energy because when the ball is dropped from a lower height,\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.”
  + **Negotiation Phase II – Share Data with the Groups**
* Next students compare their findings with the other groups by writing their statements on the board. Make a color coded graph to show the findings of each group. ***GLE 0407.Inq.4 Identify and interpret simple patterns of evidence to communicate the findings of multiple investigations.***
  + - Allow the group time to discuss the results.
  + **Negotiation Phase III – Compare Findings to Scientific Community**
* Compare the group’s findings with accepted scientific knowledge. ***GLE 0407.Inq.6 Compare the results of an investigation with what scientists already accept about this question.***
  + - Check the textbook for its explanation of potential and kinetic energy, and watch Brain Pop, “Kinetic Energy” and “Potential Energy.”
    - Discuss whether your results match that of the scientific community.
  + **Negotiation Phase IV- individual Reflection** 
    - Record findings under the Reflections heading.
    - Students will also record their opinions of the experiment.
  + **Exploration of Post-Instruction Understanding**
    - Students may be accessed through observation, participation, and by reading the entries they make in their science notebook.
    - A quiz may be given which includes hypothetical situations that incorporate students’ lab experiences.